

XI.—*A List of the Ferns of Simla in the N. W. Himalaya between Levels of 4,500 and 10,500 Feet.*—By H. F. BLANFORD, F. R. S.

[Received May 12th ;—Read June 6th, 1888.]

(With Plates XVI.—XXI.)

In the course of my summer residence at Simla during the last ten, and more particularly the last five, years, I have availed myself of such opportunities as have offered to collect and examine the materials for a list of the local ferns. The limits of my field of work have necessarily been determined by considerations of ready accessibility, and do not extend much below 4,500 feet on the one hand, nor above 10,500 feet on the other. I have, indeed, sometimes visited lower slopes and valleys both in the neighbourhood of Simla and in Chamba and the Jumna valley, but my examination of these lower levels has been too imperfect to admit of my attempting anything like so complete a list of their fern flora as for the range of elevations between the limits above specified. To the ferns occurring between 4,500 and 10,500 feet, therefore, this list is restricted.

In lateral extension, it takes cognizance of that portion of the Simla ridge which extends from the south-western limits of the station to the further side of Hatu, a distance by the Great Tibet Road of about 52 miles, but beyond the immediate neighbourhood of Simla my examination of the hill slopes has been restricted to levels above 8,000 feet.

As is well known, Simla stands on that ridge of the Himalaya which divides the drainage of the Sutlej from that of the Tonse and Jumna, the former a tributary of the Indus, the latter, of the Ganges, and is therefore a part of the main watershed of India. The outer hills, between Simla and the plains, are for the most part bare of forest, and the absence of shade and the dryness of the air which blows up from the plains during many months of the year are eminently unfavourable to plants so fond of coolness and moisture as the majority of the fern tribe. East of Simla, in the direction of the mountains, forests were at one time dense and vigorous, but for a distance of thirty miles most of those on the Simla ridge have now been either destroyed and cleared, or so far wasted and denuded of all their larger timber that, save where protected of late years, they present little more than stretches of brushwood and small coppice. A few remnants, however, still exist at Mashobra and Mahalu; and the northern faces and summits of Kumalhari and Hatu are still covered with magnificent forests, which afford rich ground for fern collectors and, indeed, botanists generally.

In the glens and valleys below Simla, destruction has been equally at work; and there can be little doubt that, 20 or 30 years ago, the fern



Chas. Fitch lith.

West, Newman & Co imp.

ASPENIUM (DIPLAZIUM) TORRENTIUM. C.E. Clarke.





Chas. Fitch lith.

West, Newman & Co. imp.

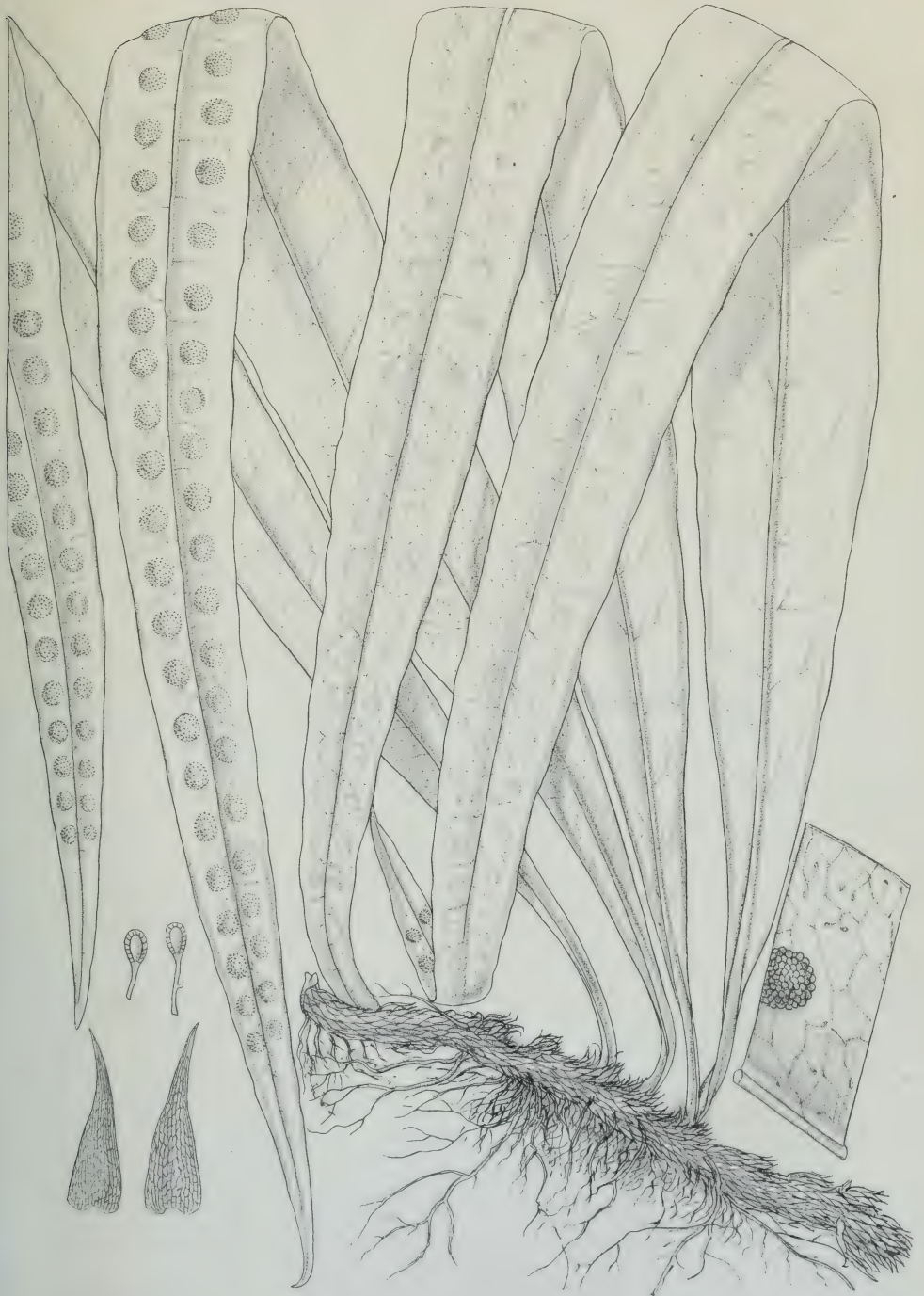
ASPENIUM (DIPLAZIUM) LATIFOLIUM D. Don. var. FRONDOSA. Wall. sp.



Cha. Fitch, lith.

West, Newman & Co imp.

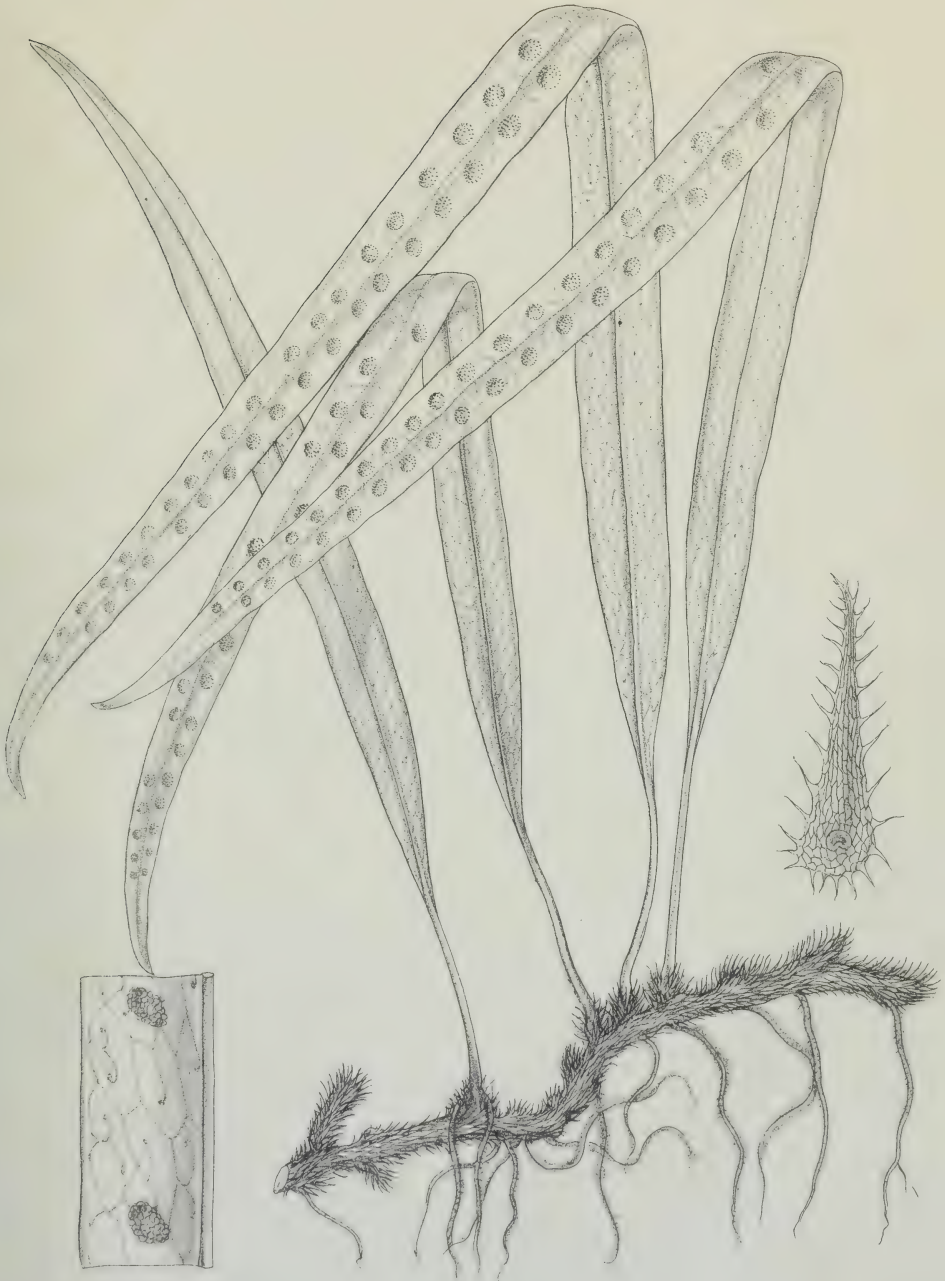
POLYPODIUM (PHYMATODES) LINEARE. *Thunb.*



Cha. Fitch, lith.

West, Newman & Co imp.

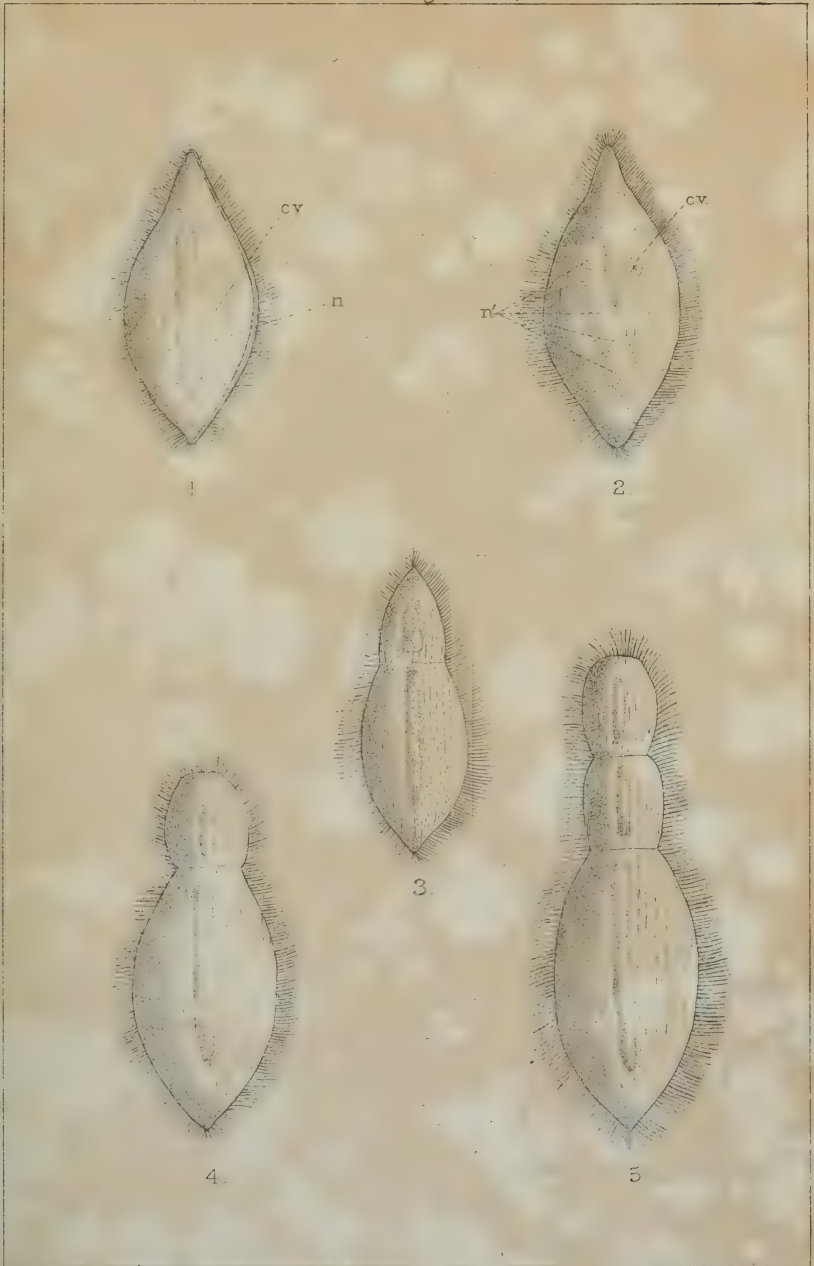
POLYPODIUM (PHYMATODES) SIMPLEX Swartz.



Chas Fitch lith.

West, Newman & Co^o imp.

POLYPODIUM (RUMICOIDES) CLATHRATUM Clarke.



H.H.A. del

A.T.Mitter, Govt School of Art, Calcutta. Lith.

ANOPLOPHERA ÆOLOSOMATIS, n.sp.

flora of this neighbourhood was far richer in individuals and, to some extent probably, in species than it now is. In 1877 and 1882, in the course of a very superficial search, I obtained two or three species which I have since hunted for in vain; and, in a list of ferns collected between 1875 and 1877, drawn up by one who appears to have been a careful and competent collector, and published anonymously in the latter year, twenty-two other species and varieties are enumerated which I have not met with. Some few of these are doubtless from either lower or higher levels than those here adopted as limits, and one or two may be erroneous determinations, but it is very likely that several have since been extirpated.

The 1877 list enumerates 86 species and varieties; my own, not less than 101, and it therefore includes 37 which are not in the former; but 20 of these were not then described, or at all events had not been identified as Indian ferns, and some of them may possibly have been included under other and erroneous names. And five of my own list I consider as doubtfully distinct. It contains, therefore, but 12 distinct forms, well known as Indian in 1877, which escaped the former collector.

The names in the 1877 list which do not appear in mine, omitting those which have been changed, or which I have rejected, are the following :—

- Trichomanes auriculatum.*
- Cystopteris fragilis* (a high level form).
- Cheilanthes rufa* (a low level fern).
- Pteris longipinnula.*
- Asplenium heterocarpum.*
- A. tenuifolium.*
- A. Hohenackerianum.*
- A. oxyphyllum.*
- Nephrodium gracilescens.*
- N. thelypteris.*
- N. cochleatum* (a low level fern).
- N. Brunonianum* (a high level fern).
- N. barbigerum* (ditto).
- N. sparsum.*
- N. setigerum* (a low level fern).
- Polypodium appendiculatum.*
- P. punctatum.*
- P. adnascens* (possibly *P. fissum*).
- P. hiemiontideum.*
- P. propinquum* (perhaps *P. rivale*).
- P. juglandifolium.*
- Gymnogramme tolla.*

Of these, *T. auriculatum*, *Pt. longipinnula*, *Asp. heterocarpum*, *A. tenuifolium*, *Neph. gracilescens*, *N. setigerum*, *Pol. appendiculatum*, and *P. hiemiontideum* are not known from the N.W. Himalaya, and *Aspl. Hohenackerianum* not from Northern India, and some at least probably rest on erroneous identifications. *Cyst. fragilis*, *Cheil. rufa*, *Neph. cochleatum*, *N. Brunonianum*, and *N. barbigerum* are quoted either from higher or lower levels than those of my list. The others may either have disappeared of late years, or, if still existing in the neighbourhood of Simla, they have escaped my notice.

In the nomenclature of my list, I have generally followed Mr. Clarke's review of the ferns of Northern India, read before the Linnæan Society in June, 1879, and published in their Transactions; and I am indebted to Mr. Clarke and Dr. King for the identification of some forms, especially the *Diplaziums*, three of which I give on Mr. Clarke's authority. I should myself have considered these as mere forms of *Asp. polypodioides*, or perhaps rather *Aspl. umbrosum*. In a few cases, I have ventured to depart from Mr. Clarke's views, dividing specifically forms which he has associated, and associating others which he has, although with doubt, enumerated under different specific names. The following are the principal instances:—

Adiantum Edgeworthii is recognized as specifically distinct from *A. caudatum*. Col. Beddome has suggested the separation, and I fully concur with him.

Two varieties of *Cheilanthes farinosa* are separated from the type and so named. And *Cheilanthes Dalhousiæ*, as well as *Cheilanthes albomarginata*, are recognized as good distinct species. I have collected both largely and find them to be constant forms with no tendency to graduate into *Ch. farinosa*.

Wallich's *Asplenium (Athyr.) tenuifrons* is separated from *A. nigripes*, the habit, elevation, range, and character of the habitat of the two being quite distinct.

Mr. Clarke's *Aspl. filix fœmina*, var. *polyspora* has since been recognized as identical with A. Brongniart's *Athyr. Schimperii*, to which I have therefore referred it.

Wallich's *Athyr. pectinatum*, which Mr. Clarke treats also as a variety of *A. filix fœmina*, is also separated. It has a creeping root-stock and in other characters is sufficiently distinct and characteristic.

Mr. Clarke's *Neph. filix mas*, var. *normalis* passes by such indefinite gradations into the form which he identifies with *N. rigidum* that it is impossible to separate them. This appears to have been more than surmised by Mr. Clarke himself.

The Simla fern which has been referred to *Neph. canum*, J. Smith,

is inseparable from *N. prolixum*, as also Mr. Clarke suspected; I learn from Mr. Baker that the original habitat of the type is unknown, and the Simla ferns do not correspond with it very closely. *N. canum* is therefore omitted from my list.

Lastly, I follow Col. Beddome in separating *Polypodium simplex* from *Pol. lineare*. The former is a thin-fronded, eminently perishable fern which shrivels up and disappears with the first breath of the dry northerly wind. The latter is a thick coriaceous fern which simply rolls up its fronds at the end of the rains and waits till the damp air and rain of the following monsoon once more unrolls them and restores their torpid vitality. *P. clathratum*, Clarke, is a third allied, but quite distinct, species very abundant in Simla.

There are a few other changes that, as the result of my own experience in the field, I should be inclined to make, but I have refrained in deference to Mr. Clarke's wider knowledge.

It is much to be desired that botanists should agree to some general rule to regulate specific distinction in dealing with forms so variable and yet presenting so few marked characters as ferns. At present, the practice of different describers is by no means uniform, and that which each follows is generally to be gathered only by inference from the results of his work. The rule which I have formulated for my own guidance is that, when two sets of forms which can readily be distinguished apart occupy the same or contiguous areas (if as far as is known they are not linked by intermediate forms either in these areas or in the interval between them), they should be recognized as distinct species, and such distinction would not be invalidated by the existence of a form possessing intermediate characters in some far distant region. On such grounds I base the separation of *Cheilanthes Dalhousiæ* from *Cheilanthes farinosa*, and *Adiantum Edgeworthii* from *A. caudatum*.

I attach much importance too to marked differences of habit such as have been noticed above in the case of *Polypodium lineare* and *P. simplex* (in this case, however, the two forms have a different venation also). And especially when these are accompanied with equally marked differences in the characters of the habitat and the range of elevation of the contrasted forms. Thus *Asplenium tenuifrons* differs from *A. nigripes*, not only in the manner of its growth, and the form and texture of the frond, but it is restricted to levels below 7,000 feet and the immediate neighbourhood of streams; whereas *A. nigripes* grows on well shaded hill slopes, only at elevations above 8,000 feet. In all these cases no intermediate forms are met with.

The following is a numerical generic summary of the species and varieties enumerated in this list.

	Species.	Varieties.
<i>Woodsia</i>	1	
<i>Dicksonia</i>	1	
<i>Trichomanes</i>	1	
<i>Davallia</i>	3	1
<i>Adiantum</i>	6	
<i>Cheilanthes</i>	4	2
<i>Onychium</i>	1	1
<i>Cryptogramme</i>	1	
<i>Pteris</i>	5	
<i>Woodwardia</i>	1	
<i>Asplenium</i>	21	3
<i>Aspidium</i>	6	2
<i>Nephrodium</i>	7	4
<i>Oleandra</i>	1	
<i>Polypodium</i>	18	
<i>Notholaena</i>	1	
<i>Gymnogramme</i>	4	
<i>Osmunda</i>	2	
<i>Ophioglossum</i>	1	
<i>Botrychium</i>	3	
Total	88	13

List of Ferns collected in the Neighbourhood of Simla between the Levels of 4,500 and 10,500 Feet.

1. *WOODSIA ELONGATA*, Hook.

Common on Kumalhari and Hatu, above 9000 ft. At Baghi, at the eastern extremity of Hatu, it occurs as low as 8,500 ft.

2. *DICKSONIA SCABRA*, Wall.

Rare. Found only at 5,800 and 6,000 feet below Simla.

3. *TRICHOMANES BIPUNCTATUM*, Poir.

Not common. My highest is 6,500 feet. Also on damp rocks and trees below Simla at 5,500 and 5,800 ft.

4. *DAVALLIA (LEUCOSTEGIA) IMMERSA*, Wall.

Very rare. Mentioned in the 1877 list. The only specimen I have seen is a barren frond found by Col. Collett at 5,800 ft.

5. *DAVALLIA (LEUCOSTEGIA) PULCHRA*, Don. sp.

The typical form, distinguished by its red rachis, obtuse segments and ovate scales of the rhizome is abundant on trees on Kumalhari and Hatu above 8,500 ft., but does not occur lower.

6. *DAVALLIA PULCHRA*, var. *pseudocystopteris*, Kunze sp.

Very abundant on trees at Simla between 5,500 and 8,000 ft. It is to be met with only in the rains, and blanches and shrivels up with the first northerly winds, about the beginning of September, except in damp ravines, where it lasts a few weeks later.

7. *DAVALLIA (STENOLOMA) CHINENSIS*, Swartz.

Rare. In two ravines below Chota Simla at about 5,000 ft. Clarke quotes it from Kumaon; but it is rare at Mussoorie.

8. *ADIANTUM LUNULATUM*, Burm.

At 4,500 ft. in the Sainal valley below Simla, but at no higher elevation. It ranges over the plains of India in damp places.

9. *ADIANTUM CAUDATUM*, L.

Common in damp situations by streams from 5,000 ft. downwards. Abundant in the Doons and Sivaliks.

10. *ADIANTUM EDGORTHII*, Hook.

Found in situations similar to the preceding, but at higher levels. It is not common, but I have gathered it in several ravines below Simla up to 6,000 ft.

11. *ADIANTUM CAPILLUS VENERIS*, L.

Common on damp rocks by streams below 6,000 ft. In the arid climate of Beluchistan, it grows in the subterranean water-courses (termed *karezes*) used for irrigation.

12. *ADIANTUM VENUSTUM*, L.

One of the commonest and most abundant ferns of Simla, covering banks and sloping ground in shady places, and ranging from 4,500 ft. up to the top of Hatu at 10,500 ft.

It varies much in cutting, being either 2- or 4-pinnate. Also in the shape and size of the ultimate pinnules, which vary from narrowly

cuneate to rhomboidal and transversely elliptical, being broader than deep. Both series of forms occur throughout the range. The sori are generally orbicular reniform with a deeply notched margin; but sometimes oblong with a straight margin.

13. ADIANTUM PEDATUM, L.

Rare. I have found it only on the north face of Hatu, at elevations of 8,500 and 10,000 ft. This last is nearly 1,000 ft. higher than Clarke's and Beddome's highest assigned range.

14. CHEILANTHES SUBVILLOSA, Hook.

Chiefly above 8,000 ft. But I have found stragglers as low as 7,300 ft. on Jako. It is common in the neighbourhood of Matiana and Nagkanda, on the bank by the roadside.

15. CHEILANTHES DALHOUSIÆ, Hook.

Quite distinct from *C. farinosa*, and subject to little variation. Its range is from 7,800 ft. to the highest visited (10,500 ft.). Fine specimens are to be found on Jako, though not common. It is more abundant on Kumalhari and Hatu.

It appears to be restricted to the Himalaya, and is most abundant in the N. W. Himalaya. In Sikkim it appears to be rare, but Sir J. Hooker gathered it at 10,000 ft. on Lacheely, and Mr. Levinge found it growing plentifully on Sinchal close to Darjiling at 8,000 ft. He agrees with me as to its specific value. The following is a description of its distinctive characters.

Stipes 2 to 4 ins. long, shorter than the frond, naked or with a few lax spreading scales near the base. Fronds 6 to 9 inches long, 2 to 4 inches broad, acute lanceolate, without white powder at any stage of growth. Lower two pairs of pinnæ subequal. Segments narrow. Lines of sori interrupted at the sinus. Involucres even, crenate or toothed on the margin, hardly lacerate.

16. CHEILANTHES ALBO-MARGINATA, C. B. Clarke.

Very abundant in and around Simla, covering the roadside banks and old stone retaining walls. Range from 4,800 ft. (my lowest) up to 8,500 ft., above which it is replaced by *Ch. Dalhousiæ*. Like that species it appears to be restricted to the Himalaya and chiefly to the N. W. Himalaya, though I learn from Mr. Levinge that his native collector brought him a specimen from the interior of Sikkim. A *Cheilanthes* which occurs on the Khasi hills, also Mount Abu and the Nilgiris, and

has been referred to this species, is that which I describe below as *Ch. farinosa*, var. *anceps*. The following is a description of *C. albo-marginata*, which is well represented in the figure Plate 52 of Mr. Clarke's Review, except that the scaliness of the costæ and veins is not fully shown.

Stipes 4 to 10 ins. long, generally shorter than the frond, bearing throughout dark linear lanceolate scales with pale translucent margins. Similar scales extend to the primary and secondary rhachises and costæ. Fronds up to 11 inches long, acute deltoid, under surface naked or in the young state, and in the small fronds that persist through the dry season, thinly coated with yellowish white powder. Lowest pair of pinnæ generally the longest. Segments oblong. Lines of sori scarcely interrupted at the sinus. Margins of involucre highly lacerate.

It is always readily distinguishable from other allied forms by the presence of scales on the veins and costæ, and by the highly lacerate involucre.

17. CHEILANTHES FARINOSA, Kaulf, var. *typica*.

This is very abundant in the Sivaliks and Doons and in the deeper valleys of the outer Himalaya up to 4,000 ft. In the neighbourhood of Simla, it may be found as high as 5,000 ft., above which I have not met with it. The following characters distinguish it from other allied forms.

Stipes up to 12 ins. long, generally longer than the frond, deep red brown, naked or with a few linear scales, near the base only. Frond deltoidly lanceolate, acute to acuminate, up to 8 ins. long and 5 ins. broad, always thickly coated beneath with white powder. Lowest pair of pinnæ always the longest. Segments narrow. Sori continuous round the sinus. Margins of involucre entire, uneven or toothed, not lacerate.

This form ranges all over India. I have collected it at Pachmari at 3,000 ft., and I have specimens from the Khasi hills at 3,000 and 5,000 ft., and from the Nilgiris up to 6,000 ft.

18. CHEILANTHES FARINOSA, var. *anceps** nov.

This has been frequently confounded with *Ch. albomarginata*. It appears to have as wide a range in India as the typical variety. In the North-West Himalaya, it has a well defined, but restricted, range of elevation, viz., from 3,500 to 6,000 ft., and is common below Simla between 4,500 and 5,000 ft. Its characters are as follow :—

* This was described as *C. anceps* in a paper entitled, 'The silver Ferns of Simla and their Allies, read before the Simla Natural History Society, June 25th, 1886.